Upper Extremity Outcome Instruments – My Experience

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Overview

- Description and Personal Perspective
  - Disability of the Arm Shoulder and Hand (DASH)
  - Patient-Rated Wrist Evaluation (PRWE)
  - Michigan Hand Questionnaire (MHQ)
  - Modern Activity Subjective Survey of 2007 (MASS07)
- Discussion at Oxford – latest findings and Oxford tools
  - Key Components of Patient Reported Outcome Measures
- How the current Upper Extremity tools compare

DASH – Description

- Developed 1996 and intended for clinical and research assessment of upper extremity health
- Developed through collaboration
  - American Academy of Orthopedics (AAOS)
  - Institute for Work and Health (IWH)
  - the Upper Extremity Collaborative Group (UECG)
- Items generated from Literature Review, Clinician/Surgeon and Expert input
  - patients were involved in validity testing
- Validated through IWH through prospective trial of 109 patients

Key Components of Validation

- Internal Consistency
- Reliability/Test-Retest
- Validity – does it measure what its supposed to
  - Content Validity – asks about topics clearly
  - Construct Validity – produce anticipated relationships with other variables
- Sensitivity to Change

DASH – Description

- DASH consists of 2 sections for a total of 30 questions
- Measurement Concept - Overall Upper Extremity Health
- Two Domains
  - Symptoms
    - pain
    - weakness
    - tingling/numbness
    - stiffness
  - Function
    - physical
    - social
    - psychological

DASH – Scoring

- Score Calculated:
  - calculation normalizes scores from 0 - 100
  - lower scores = better function/symptoms
- MCID = 10
  - Gummesson, C. et al. (2003) *BMC Musculoskeletal Disorders*. Based on Shoulder Impingement and carpal tunnel surgery results

DASH – Experiences

- Positive
  - multi-centered/non-centered specific development and testing
  - overall assessment of upper extremity health
  - shown to be a good measure of any upper extremity problem
- Drawbacks
  - doesn’t look at handedness
  - non-wrist specific
  - patient evaluation only, excludes surgeon
  - no hand dominance
  - relatively long

QuickDASH - Description

- Developed through IWH to address relatively long DASH questionnaire
- QuickDASH consists of 11 questions
- Validated through NIH to correlate QuickDASH scores to full length DASH scores

DASH – Project Use

Basal Joint Osteoarthritis of the Thumb: A Prospective Trial of Steroid Injection and Splinting

Charles S. Day, MD, Richard Gelberman, MD,
Alpesh A. Patel, MD, *St Louis, MO*, Molly T. Vogt, MSc, *Pittsburgh, PA*,
Konstantinos Ditsios, MD, Martin I. Boyer, MD, *St Louis, MO*

DASH – Project Use

Low-Profile Dorsal Plating for Dorsally Angulated Distal Radius Fractures: An Outcomes Study

Atul F. Kamath, BA, David Zurakowski, PhD, Charles S. Day, MD

From the Department of Orthopaedic Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA; and the Department of Orthopaedic Surgery, Children's Hospital Boston, Boston, MA.

DASH – Project Use

Techniques in Hand & Upper Extremity Surgery 11(2):142–148, 2007

TECHNIQUE

Low-profile Dorsal Plating for Dorsally Angulated Distal Radius Fractures

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Distal Radius Fractures

Functional Outcomes for Unstable Distal Radial Fractures Treated with Open Reduction and Internal Fixation or Closed Reduction and Percutaneous Fixation

A Prospective Randomized Trial

By Tamara D. Rozental, MD, Philip E. Blazar, MD, Orrin I. Franko, BS, Aron T. Chacko, BS, Brandon E. Earp, MD, and Charles S. Day, MD

Investigation performed at the Departments of Orthopaedic Surgery, Beth Israel Deaconess Medical Center, and Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts

- Prospective randomized trial comparing 2 surgical treatment options in DRFs

SCIENTIFIC ARTICLE

Complications of Low-Profile Dorsal Versus Volar Locking Plates in the Distal Radius: A Comparative Study

Yangyang R. Yu, BA, Melvin C. Makhni, BS, Shervin Tabrizi, BA, Tamara D. Rozental, MD, George Mundanthanam, MD, Charles S. Day, MD, MBA

- Comparing surgical complication rates in DRFs

Older Patient Populations

- Complications are worth the risk if there is improvement in functional outcome
- Literature supports anatomical reduction in younger patients

- But what about in the older population?

Older Patient Populations

- McQueen et al., *JBJS* 1988: “We conclude that **malunion** of a Colles’ fracture **results in weak, deformed, stiff and probably painful wrist.**”
- Board et al., *Injury* 1999: “There was a **strong correlation between functional outcome and both dorsal angle and radial length** at union [in patients over 55 years].”

Older Patient Populations

- Roumen et al., *JBJS* 1991: "…in patients over the age of 55 years…**we found no correlation between final anatomical and functional outcome….**"
- Young et al., *JHS* 2000: "**The radiographic outcome** [in low-demand patients > 60 y/o] **did not correlate with the functional outcome.**"

Is the Difference based on the outcome instruments being used?

DASH – Project Use

Clin Orthop Relat Res (2009) 467:1612–1620
DOI 10.1007/s11999-008-0660-2

ORIGINAL ARTICLE

Distal Radius Fractures in Older Patients

Is Anatomic Reduction Necessary?

Andrew J. Synn BA, Eric C. Makhni BS,
Melvin C. Makhni BS, Tamara D. Rozental MD,
Charles S. Day MD, MBA

- assessment of function

PRWE - Description

- Utilized for specific wrist problems
- Developed in 1998 for clinical assessment
  - Hand and Upper Limb Centre, St. Joseph Health Center (London, Canada)
  - Kinetex Innovative Assessment and Rehabilitation Centre (Waterloo, Canada)
- Surveyed 100 (66 responded) international wrist investigators (IWIW) to generate items
- Item generation from patient interviews

PRWE – Description

- Validated via Prospective study done with Distal Radius Fractures and Scaphoid Fractures in 101 patients
- 2 Sections for a total of 15 questions
- Measurement Concept – Wrist Function
- Consists of 2 domains for patients
  - pain
  - function

PRWE – Scoring

- Scoring
  - Functional score is out of 50
  - Pain score is out of 50
    - Average both sections
  - Add Function and Pain scores
    - normalizes to scale of 1 – 100
  - Less score = better outcome

- MCID = 12
  - Schmitt JS, Di Fabio RP (2004) J of Clinical Epidemiology, 57: 1008-1018.

PRWE – Experiences

- Started using PRWE to supplement DASH in order to focus on the wrist
- Positives
  - developed with patient interviews
  - region-specific (wrist) assessment
  - short, quick and reliable
- Drawbacks
  - validated / developed from fewer centers
  - region-specific
  - no hand dominance

University of Michigan
Medical School

MHQ - Description

- Initially developed by surgeons at University of Michigan Medical Center
- Developed through
  - evaluation of existing questionnaires
  - any questions pertaining to the hand were incorporated into the MHQ
  - hand patient panel developed additional items
- Evaluated through patient, surgeon, and therapist panel to categorize the scales

MHQ - Description

- Given to psychometricians to identify unclear and redundant items
- Factor analysis used to pare down questionnaire
- Validation was done by the same group of researchers

MHQ - Description

- 6 Sections (scales) for total of 65 Questions including demographics
- Overall Concept – Evaluation of the Hand
- Multiple Domains
  - Function
  - Active Daily Living activities
  - Pain
  - Work Performance
  - Aesthetics
  - Patient Satisfaction

MHQ - Scoring

MHQ Scoring Algorithm*

Scale	*Recode†*	*Raw Score Range‡*	*Normalization§*
Overall hand function	None	5 to 25	−(raw score −25)/20*100
Activities of daily living	None	5 to 25 1-handed	= −(raw score −25)/20*100
		7 to 35 2-handed	= −(raw score −35)/28*100
		Overall ADL	= (1-handed+2-handed)/2
Work	None	5 to 25	(raw score −5)/20*100
Pain	Question 2: (1 = 5) (2 = 4) (4 = 2) (5 = 1)	5 to 25	If question 1 = 5, then pain score = 0; if question 1 ≠ 5, then −(raw score −25)/20*100
Aesthetics	Question 1: (1 = 5) (2 = 4) (4 = 2) (5 = 1)	4 to 16	(raw score −4)/16*100
Satisfaction	None	6 to 30	−(raw score −30)/24*100

* The scoring algorithm is available from the authors in SAS program.
† The response categories for some of the questions are reversed and are recoded.
‡ Sum of the responses for each scale.

- MCID = depends on disease and domain of questionnaire, e.g. CTS can have 8, 13, or 23
  - Shauver, M., Chung, K. (2009). J of Hand Surg. 34: 509-514

MHQ – Experiences

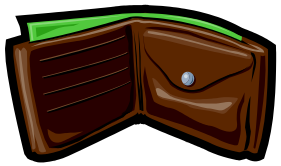
- Positives
  - region-specific
  - detailed
  - hand dominance
- Drawbacks
  - doesn’t add any new clinical assessment wrt DASH and PRWE
  - scoring system confusing
  - time consuming to administer
  - burdens patients with 65 questions

Addressing a Common Problem

- How about modern activities?
  - Typing
  - Manipulating a Mouse
  - Cell Phones
  - Shooting digital photos
  - Taking money out of wallet/purse
  - Writing a check
  - Other small activities







MASS07

	Functional Task	No Difficulty	Unable to Do
1.	Type on a keyboard	N/A 0 1 2 3 4 5 6 7 8 9 10	
2.	Use a computer mouse	N/A 0 1 2 3 4 5 6 7 8 9 10	
3.	Dial a cell phone / telephone	N/A 0 1 2 3 4 5 6 7 8 9 10	
4.	Take a photograph with a camera	N/A 0 1 2 3 4 5 6 7 8 9 10	
5.	Pull an item from a pocket/purse	N/A 0 1 2 3 4 5 6 7 8 9 10	
6.	Write a check	N/A 0 1 2 3 4 5 6 7 8 9 10	
7.	Take a dollar bill out of a wallet	N/A 0 1 2 3 4 5 6 7 8 9 10	
8.	Plug a cord into a power outlet	N/A 0 1 2 3 4 5 6 7 8 9 10	
9.	Do laundry / fold clothes	N/A 0 1 2 3 4 5 6 7 8 9 10	
10.	Type on a handheld device	N/A 0 1 2 3 4 5 6 7 8 9 10	

MASS07

JHS(E)

2008) 33E: 5: 653–660

VALIDATION OF A MODERN ACTIVITY HAND SURVEY WITH RESPECT TO RELIABILITY, CONSTRUCT AND CRITERION VALIDITY

M. ALEXANDER, O. I. FRANKO, E. C. MAKHNI, D. ZURAKOWSKI and C. S. DAY

Department of Orthopedic Surgery, Beth Israel Deaconess Medical Center, Boston, MA, Harvard Medical School, Boston, MA and the Department of Orthopedic Surgery, Children's Hospital Boston, Boston, MA, USA

MASS07 - Description

- Intended for clinical and research assessment
- Developed to address clinical need
  - Beth Israel Deaconess Medical Center
  - Harvard Medical School
  - assess more **modern activities** as compared to the DASH, PWRE, and MHQ
- Surgeons questioned for item generation
- Pilot tested with patients after initial development

MASS07 – Description

- Intention to produce short survey to evaluate wrist and hand function
- 10 Questions evaluating function and how injury affects daily activities
- Validated through 42 volunteer patients

MASS07 – Scoring

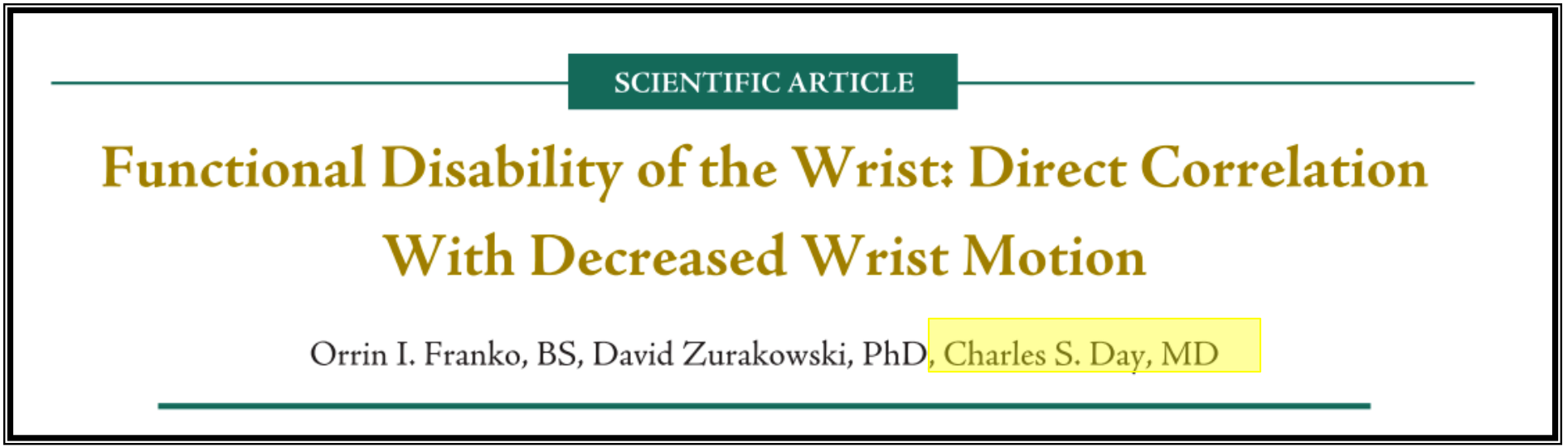
- Scoring
  - 10 questions from scale of 1-10
  - Sum each questions rating for overall score from 1 – 100

- MCID is unknown

MASS07 – Experiences

- Positives
  - addresses activities that impact quality of life and daily activities more
  - short and quick
  - scoring method is straightforward
- Drawbacks
  - May not be appropriate for all patient populations, i.e. older populations who might not use cell phone or hand held devices
  - no hand dominance
  - no patient input

MASS07 – Project Use



SCIENTIFIC ARTICLE

Functional Disability of the Wrist: Direct Correlation With Decreased Wrist Motion

Orrin I. Franko, BS, David Zurakowski, PhD, Charles S. Day, MD

- first, non-validated use of MASS07, concurrent with DASH and PRWE
- satisfaction with treatment

Bunnell Traveling Fellowship

ASSH
American Society for Surgery of the Hand

Sterling Bunnell, M.D

“Father of Hand Surgery”

Bunnell Traveling Fellowship

"The purpose of the Bunnell Fellowship is to sponsor a young Hand Surgeon in the development of national and international relationships which contribute to his/her **pursuit of higher learning**, and which foster the principles of scholarship of the American Society for Surgery of the Hand."

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Bunnell – Themes and Objectives

- National Quality of Healthcare Initiative
- Global Innovations in Wrist Surgery
- Developing National and International Relationships

National Quality of Healthcare Initiative

The Dartmouth Institute For Health Policy & Clinical Practice

2011-2012 Sterling Bunnell Traveling Fellowship

THE DARTMOUTH INSTITUTE
FOR HEALTH POLICY & CLINICAL PRACTICE

James Weinstein, DO, MS

CEO and President of Dartmouth-Hitchcock
Founder
Spine Center at Dartmouth-Hitchcock
Co-founder
The Dartmouth Center for Health Care Delivery Science

National Quality of Healthcare Initiative

Cleveland Clinic

Cleveland Clinic, Cleveland

MetroHealth

Michael Keith, MD

Chief, Orthopaedic Hand Service
MetroHealth Medical Center
Professor
Case Western Reserve University SOM

2011-2012 Sterling Bunnell Traveling Fellowship

National Quality of Healthcare Initiative Washington D.C.

2011-2012 Sterling Bunnell Traveling Fellowship

Janet Corrigan

Former President and CEO
National Quality Forum

Three major quality goals:

1) Patient engagement in decision making
2) Patients are actually achieving the things that medical care is supposed to enable
3) Are we doing 1&2 in a cost-efficient manner?

NQF
National Quality Forum

National Quality Forum, Washington, D.C.

Carolyn Clancy, M.D.

Director

Agency for Healthcare Research and Quality

- Under United States Department of Health and Human Services (HHS).
- Mission: improve the quality, safety, efficiency and effectiveness of healthcare
- Funding people and projects for policy creation

Faisal Mirza, M.D.

Medical Officer
Orthopaedic Device Evaluation, Regulation, and Research
U.S. Food and Drug Administration

Patrick Conway, MD, MSc

Chief Medical Officer, CMS
Director
Office of Clinical Standards and Quality

William Kassler, MD

Chief Medical Officer, New England Region
CMS

Professor Andrew Carr FRCS FMedSci

Nuffield Professor of Orthopaedic Surgery
University of Oxford
Head, Nuffield Department of Rheumatology & Orthopaedics

UNIVERSITY OF OXFORD

University of Oxford, UK

The Importance of PROs

- UK NHS system for coverage all citizens
- National Institute for Health and Clinical Excellence (NICE) –, i.e. **functional outcomes**
- Therefore, it is critical that functional outcome measurement tools, i.e. PROMs, be developed and validated appropriately

Jill Dawson, Ph.D.

Senior Research Scientist
Department of Public Health
Oxford University

Oxford, UK

Oxford Developed PROMs

- **Andrew Carr and Jill Dawson developed**
  - **Oxford Shoulder Score (OSS)**
  - **Oxford Shoulder Instability Score (OSIS**
  - **Oxford Elbow Score (OES)**
  - Oxford Knee Score (OKS)
  - Oxford Foot Score (OFS)
  - Oxford Hip Score (OHS)

Oxford Developed PROMs

- Multiple Specialties including Orthopedics
- Joint Collaboration
  - Health Services Research Unit of the Department of Public Health
  - Nuffield Orthopaedic Centre
- Purpose to create PROMs that were patient-centered and specific

Why did Oxford develop their own?

- Several key discrepancies led to Oxford scores
  - data depended on surgeon's judgment which could lead to bias
  - no reliable shorter, more specific, simpler tools existed for region(s), e.g. shoulder
  - patient involvement was limited

Key Components to Consider

- Key Development Components
  - Specificity
  - Burden on Patients
  - **Patient involvement**
  - Scale of Development
- Key Validation Components
  - Reliability, Validity, Clinical Differences, Sensitivity to Change
  - Comparison to Other Tools
  - **Patient Involvement**

In Summary

Upper Extremity PROM Comparison

PROM	Item Generation & Reduction	# of ?s	MCID
DASH (QuickDASH)	- Literature Review - Doctor & Expert Input	30 (11)	10
PRWE	- Expert Survey - Patient Interviews	15	12
MHQ	- Other Surveys - Patient Panel confirmation	65	Variable
MASS07	- Clinical Practice Observations	10	Unknown

Upper Extremity PROM Comparison

PROM	Validation Key Components
DASH	Standard Validation From above
PRWE	Standard Validation from above
MHQ	Psychometric Content Validity
MASS07	Standard Validation from above

Upper Extremity PROM Comparison

PROM	Positives	Negatives
DASH	- Scale of development - Multi-centered tested	- Non-Region Specific - Relatively Long
PRWE	- Region-Specific - Patients generating items	- Region-Specific
MHQ	- Region-Specific	- Patient Burden - Scoring Confusing - Region-Specific
MASS07	- Modern activities - Short, quick, easy to use	- No patient involvement

Thank You

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